DOCUMENT RESUME

ED 065 471 SP 005 784

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TITLE Additive Effects of Advance Organizers.
PUB DATE Apr 72
NOTE 13p.; Paper presented at the Annual Meeting of the American Educational Research Assn., Chicago, April 1972

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS *Cognitive Processes; Educational Psychology; Educational Research; *Learning; *Learning Characteristics; *Learning Motivation; *Learning Processes; Retention Studies

ABSTRACT

It was hypothesized that the effect of advance organizers (principles, organization concepts, subsuming concepts, etc.) on learning and retention was additive rather than interactive--i.e., that any increment in score could be accounted for by specific factors such as additional information, additional practice, learning set, etc. One hundred and twenty-three college undergraduates took part in four groups. On 5- and 35-day retention measures, the advance organizer-only group was significantly better than a no-treatment control. The advance organizer plus learning group was significantly better than a learning-only group on the shorter retention period but not on the longer. The advance organizer-only group was the only group to not decline in score over the 35-day interval between measures. Results indicate the learners, after learning suitable principles at a high level of generality, are able to generate with some degree of accuracy specific answers to questions. Learners also seem to be able to retain the organizing principle well enough to regenerate answers as long as 32 days without a decrement in score. A 28-item bibliography is included. (Author/MJM)

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ADDITIVE EFFECTS OF ADVANCE ORGANIZERS

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ABSTRACT

It was hypothesized that the effect of advance organizers on learning and retention was additive rather than interactive -- i.e., that any increment in score could be accounted for by specific factors such as additional information, additional practice, learning set, etc. One hundred and twenty-three college undergraduates took part in four groups. On five day and thirty-five retention measures the advance organizer-only group was significantly better than a no-treatment control. The advance organizer plus learning group was significantly better than a learning-only group on the shorter retention period but not on the longer. The advance organizer-only group was the only group to not decline in score over the thirty-five day interval between measures. Results are discussed in terms of pedagogical strategies.

Ausubel's (1963, 1968) suggestion that learning and retention can be facilitated by the advance provision to students of organizers -- principles, organizational structure, subsuming concepts, etc. -- is intuitively appealing. He contends that providing students with an "advance organizer" facilitates learning and retention by providing "ideational anchorage" and/or increasing discriminability, clarity and stability of learning materials in cognitive structure. These introductory advance organizers are "appropriately relevant and inclusive" in nature, and "presented at a higher level of abstraction, generality, and inclusiveness." (Ausubel, 1968, p. 148-149)

There have been many attempts to validate this premise. The results of these studies are conflicting and inconclusive. Ausubel (1960) found a difference between Ss who studied an advance organizer on two separate occasions prior to the learning task and Ss who did not get an advance organizer. In two separate studies, a "comparative advance organizer" was found to be not effective except for lower ability Ss whose prior knowledge of the "potentially relatable information" was supposedly lower than other Ss (Ausubel and Fitzgerald, 1961, 1962). Differences attributable to the provision of an advance organizer were found on one occasion and not on another in two studies by Ausubel and Youseff (1963). However, using the same materials as Ausubel and Fitzgerald (1961), Wittrock (1963) was able to generate differences by merely providing Ss with a set to compare and contrast the information.

Two studies with fifth and sixth graders also got inconclusive results (Day, Houle, Lezotte, and Munger, 1967; Schulz, 1966). In both reports the authors suggested that there was a trend toward differences between advance organizer groups and no-advance organizer groups among Ss of lower ability.

Using abstract math concepts, Scandura and Wells (1967) found differences

between an advance organizer group and a no-organizer group. In a comparison among three kinds of advance organizers, Triezenberg (1968) found a verbal advance organizer used in conjunction with working models was best when attempting to facilitate learning of seventh and ninth graders on ecological systems. His advance organizer centered around the explanatory value of the concept of equilibrium. The effect was found only when Ss were tested at the comprehension level but did not appear at the knowledge or application levels. Grotelueschen and Sjogren (1968) also got mixed results but found in most cases that their three levels of advance organizers were each better than an irrelevant-advance-organizer control.

Results of the most recent studies are even more conflicting. Bauman and Glass (1970) found no facilitating effect for an advance organizer but did find facilitation when the same organizer was used as a post organizer. Allen (1970) reported no facilitative effects for an advance organizer used with ninth graders, except for an apparent trend toward advantage for lower ability students in one of two tests. Romberg and Wilson (1970) found slight facilitative effects for an advance organizer when used alone but none when it was used in conjunction with a summary. They also found consistent facilitation by merely providing the appropriate cognitive set. Post organizers have been shown to be effective sometimes when advance organizers have been lacking, in five separate studies (Harrington, 1968; Bauman, Glass and Harrington, 1969). Peterson (1971), on the other hand, found no such effects and even pointed to a significant negative effect for a post-organizer. Wiesberg (1970) achieved results indicating that maps, and graphs worked better than verbal advance organizers with earth science concepts. The value of verbal organizers at all was brought into question.

Peeck (1970) used questions as pre-organizers and included a control group that was allowed to study the content material for the additional amount of time used by other Ss in studying the organizer. His results indicated that "time spent on pre-questions might just as profitably be used for simply extending the reading time of the actual reading material" (p. 245).

The foregoing list represents a cacophony of contradictory findings. There are many possible alternative hypotheses in each study, and as a whole, very little of consistency emerges. Each study introduces new variables that confound the basic question of whether advance organizers do facilitate learning: amount of study; amount of antecedent knowledge; time factors between advance organizer, study,and test; age of Ss; subject matter type; ability of Ss; etc. The most glaring omission was indicated by Scandura and Wells (1967) who pointed out the need for two more appropriate control groups who would receive: (1) only the organizer and (2) no advance material. To date, no such study exists to help indicate whether advance organizers are interactive with the content and build together with it to provide superior learning and retention as Ausubel seems to suggest, or whether the effects, when they occur, are merely the additive effects of additional study and learning of specific information as Peeck (1970) and Wittrock (1963) imply.

The following study was an attempt to resolve that question so far as it can be resolved, considering the multitude of variables that must be sorted out and individually spoken to before any consistent, replicable results can emerge. The two suggested control groups were added: one control group that received only the advance organizer, to assess the effects of the organizer itself on the criterion dependent variable; and a no-study control to provide a baseline for the criterion measure.

It was hypothesized that the provision of an advance organizer alone, insofar as it provided additional information (though not in any way specific to the criterion test), additional practice, and had attention focusing qualities ["orienting directions", Frase (1969)],would increase scores on a retention test of subsequently presented material. This increase would be sufficient to explain any increase in a comparison group which received the advance organizer as well as the ideational materials.

METHOD

Subjects

One hundred twenty-three college undergraduates in eight sections of an educational psychology course took part. Enrollment in the sections was by normal registration procedures in which the most common consideration for choice of section was the time at which each was held.

Materials

Ideational material to be learned was contained in two approximately fifteen-hundred-word essays which were identical in organizational structure. Each essay explicated the responses of a particular psychological learning theory ("S-R" and "Cognitive") to a set of ten questions that a viable theory of learning should be able to explain (e.g. "What is learned?" and "What happens when we forget?"). These were adapted from Hilgard and Bower (1966).

The advance organizer was an attempt to explain the idea of a continuum in possible philosophical views of man -- i.e. from that of a mechanical reactive organism controlled by his environment, to that of a purposive, willful organism in control of his environment. The relative position of some psychological and developmental theories were pointed out.

It was felt that if Ss understood this concept and were able to place on this contimuum the two psychological theories to be explicated later, it would serve as a useful organizing principle at a higher level of generality and thus would qualify as an advance organizer according to Ausubel's definition (1968).

Design

Each of the eight sections was randomly assigned to one of four treatment conditions: (E) advance organizer plus learning group; (C-1) learning but no advance organizer group; (C-2) advance organizer only group; (C-3) no-treatment control group.

The dependent variable was scores on a twenty-item short-answer test at five days and thirty-seven days after presentation of the materials. Means and standard deviations were computed for each group from the resulting data.

Procedure

The experiment was carried out over a period of forty days from the first presentation of the materials to the final long-term retention test. On day one, group E, and C-2 took part in a fifty-minute class lecture presenting the ideas in the advance organizer. They also received an explication of the advance organizer in written form, a seven-hundred-sixty-word mimeographed essay. They were instructed to study the advance organizer in preparation for a test at the next class period, two days hence. Group C-1 took part in a placebo class lecture on the definition and teaching of concepts and were given a twenty-eight hundred-word essay dealing with the same topic. Ss were instructed to study the materials in preparation for a test at the next class meeting.

On day three, Ss in E, C-1 and C-2 groups took a twenty-minute test on the materials they had been given. Groups E and C-1 then took part in a thirty-

minute lecture comparing and contrasting the positions of the two psychological learning theories, vis a vis the ten specific questions.

They were then given the two passages that explicated each psychological theory, vis a vis the ten questions. They were instructed to study the essays in preparation for a test five days hence. C-2 Ss took part in a thirty-minute placebo class lecture explicating the definition and teaching of concepts, and were given the essay on the same subject. They were also instructed to study the materials in preparation for a test five days hence.

On the eigth day, all Ss took the twenty-item short-answer test. Ss in groups E, C-1, and C-2 took the test again on day forty without being previously informed that the test would take place.

All lectures and test sessions were carried out by the experimenter according to fixed notes.

Instrumentation

Questions on the retention test were identical to the ten specific issues presented in class lecture and the reading materials in groups E and C-2. Each question was presented twice: once asking for the response attributable to the "S-R" learning theorists, and once asking for the response attributable to the "Cognitive" learning theorists. The questions were randomly ordered on the test.

Protocols were scored by a graduate assistant who scored all responses to each question as a group. The inter-judge reliability coefficient for this test and scoring procedure was computed in a previous experiment and found to be .97 (Wong, 1971).

RESULTS

Means and standard deviations of the resulting tests are presented in Table 1.

T tests for the difference between means were used to assess differences between groups E and C-1 and between groups C-2 and C-3 for both retention tests. For test one data, both contrasts proved to be statistically significant [t (63) = 2.51 ($p < .01$) and t (56) = 3.71, ($p < .005$)]. For test two data, only the contrast betwe groups C-2 and C-3 was significant [t (53) = 4.62, ($p < .005$)].

DISCUSSION

The provision of the advance organizer apparently provided Ss with enough learning to allow them to score better on retention test than a control group which received no instruction. This occurred in spite of the fact that none of the infor tion contained in the advance organizer was at all specific to the questions on the tention test; none of the highly specific answers required were directly provided by the advance organizer. Of additional interest was the fact that the advance organizer group (C-2) was the only group taking both tests to not decline in performance over the thirty-two day retention period between test one and test two.

It also seems apparent that at least in this case, and perhaps in other cases showing facilitation, the effect of the advance organizer appears to have been additive - i.e. the boost in E test scores over control test scores was achievable through the provision of the advance organizer alone and not dependent on some kin of interaction with the content to be learned. This is a significant finding as this study is the only study encountered in the literature that attempted to look at this difference in effects. It also has theoretical implications in that Ausubel and his colleagues seem to suggest that in some way the advance organizer interacts with the ideational material being studied to further its learning and retention (cf. Ausubel, 1968).

Why facilitation occurs in spite of the lack of a direct relationship between advance organizer and test questions can only be speculated. Perhaps the advance organizer provides a set to learn in a specific way (Wittrock, 1963). More likely

the advance organizer either provides information from which the answers can be generated secondarily, or it acts as a stimulus to the recall of information previously learned and "forgotten".

The foregoing data are not interpreted to discount the viability of Ausubel's notion of the use of advance organizers as a suitable teaching method; rather that it may be a very good teaching method but for different reasons than he seems to suggest. What it seems to indicate for pedagogical strategy is that learners, after learning suitable principles at a high level of generality, are able to generate with some degree of accuracy specific answers to questions. What is more important, they seem able to retain the organizing principle well enough to regenerate answers as long as 32 days later without a decrement in score. This is no revolutionary finding, Katona (1940) has demonstrated this in many earlier studies which have been replicated by Hilgard and others (1953,1954) with similar results. The redemonstration in this study is, however, a significant extension performed in actual classrooms with prose materials that should not go unheeded by teachers and pedagogical strategists.

TABLE 1

Group Ns, Means and Standard Deviations for Retention

Test 1 and Test 2

Test		E	C-1	C-2	C-3
Test 1	$\bar{X}$ =	14.66	12.11	6.55	3.55
	s =	3.99	3.97	3.70	2.39
	n =	30	35	27	31.
Test 2	$\bar{X}$ =	11.23	9.69	6.63	3.55[a]
	s =	4.65	4.39	2.46	2.39
	n =	30	35	24	31

[a]The same baseline control group data was used for test 1 and test 2.

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